

Form PTO-1390		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER P21469
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			U.S. APPLICATION NO. (If known, see 37 CFR 1.5) <b>09/936526</b>
INTERNATIONAL APPLICATION NO. PCT/EP00/02198	INTERNATIONAL FILING DATE 13 March 2000	PRIORITY DATE CLAIMED 15 March 1999	
TITLE OF INVENTION METHOD FOR OPERATING A MACHINE FOR PRODUCING AND/OR IMPROVING MATERIAL WEBS			
APPLICANT(S) FOR DO/EO/US Markus OECHSLE and Frank WEGEHAUPT			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.			
<ol style="list-style-type: none"> <li><input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</li> <li><input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</li> <li><input checked="" type="checkbox"/> This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).</li> <li><input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).</li> <li><input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> <li><input checked="" type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau).</li> <li><input type="checkbox"/> has been communicated by the International Bureau.</li> <li><input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</li> </ol> </li> <li><input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371 (c)(2)).</li> <li><input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ol style="list-style-type: none"> <li><input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).</li> <li><input type="checkbox"/> have been communicated by the International Bureau.</li> <li><input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</li> <li><input type="checkbox"/> have not been made and will not be made.</li> </ol> </li> <li><input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</li> <li><input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</li> <li><input checked="" type="checkbox"/> An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (U.S.C. 371(c)(5)).</li> </ol>			
Items 11 to 16 below concern other document(s) or information included:			
11. Assignee: <u>VOITH PAPER PATENT GmbH of Heidenheim, GERMANY</u>			
12. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.			
13. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.			
14. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.			
15. <input type="checkbox"/> A substitute specification.			
16. <input type="checkbox"/> A change of power of attorney and/or address letter.			
17. <input type="checkbox"/> Figure of Drawing to be published _____			
18. <input checked="" type="checkbox"/> Other items or information: Cover Sheet and International Application as published in German. PCT/IPEA/416(in German). PCT/IPEA/409-with eight sheets of amended pages(in English and German). PCT/IPEA/408(in German). PCT/RO/101-PCT Request(in German). PCT/IB/306. PCT/IB/332. PCT/ISA/210(in English and German). Cover Letter Submitting Amended Pages of Application. Cover Letter under 35 USC 371 and 1.495. Claim of Priority. Letter to the EPO.			

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)  
**09/936526**

INTERNATIONAL APPLICATION NO.  
PCT/EP00/02250

ATTORNEY'S DOCKET NUMBER  
P20470

19. The following fees are submitted:

Basic National Fee (37 CFR 1.492(a)(1)-(5)):

Search report has been prepared by the EPO or JPO. . . . . \$ 860.00

International preliminary examination fee paid to USPTO (37 CFR 1.482). . . . . \$ 690.00

No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO(37 CFR 1.445(a)(2)). . . . . \$ 710.00

Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2) paid to USPTO. . . . . \$1,000.00

International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4). . . . . \$ 100.00

ENTER APPROPRIATE BASIC FEE AMOUNT =

CALCULATIONS

PTO USE ONLY

\$860.00

Surcharge of \$130.00 for furnishing the oath or declaration later than 20 30 months from the earliest claimed priority date (37 CFR 1.492(e)).

\$

Claims	Number Filed	Number Extra	RATE
Total Claims	30 - 20 =	10	X \$18.00
Independent Claims	3 - 3 =	0	X \$80.00
Multiple dependent claim(s) (if applicable)			+ \$270.00

\$180.00

\$0.00

\$0.00

TOTAL OF ABOVE CALCULATIONS =

\$1040.00

Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.

\$

SUBTOTAL =

\$1040.00

Processing fee of \$130.00 for furnishing the English translation later than 20 30 months from the earliest claimed priority date (37 CFR 1.492(f)).

+

Extension of Time fee in the amount of \$

TOTAL NATIONAL FEE =

\$1040.00

Fee for recording the enclosed assignment (37 CFR 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property

+

TOTAL FEES ENCLOSED =

\$1040.00

Amount to be refunded

\$

Charged

\$

a. ☒ A check in the amount of \$1040.00 to cover the above fees is enclosed.

b. Please charge my Deposit Account No. in the amount of \$ to cover the above fees.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 19-0089.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO CUSTOMER NO. 7055

AT THE PRESENT ADDRESS OF:

Neil F. Greenblum  
GREENBLUM & BERNSTEIN, P.L.C.  
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07055

PATENT TRADEMARK OFFICE

SIGNATURE  
Neil F. Greenblum  
NAME

28,394  
REGISTRATION NUMBER

P21469.A01

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Markus OECHSLE et al.	)	
			)	PCT Branch
Appln. No.	:	Not yet assigned -- U.S. National Stage of	)	
		PCT/EP00/02198	)	
			)	
Filed	:	March 13, 2000	)	
			)	
For	:	METHOD FOR OPERATING A MACHINE	)	
		FOR PRODUCING AND/OR IMPROVING	)	
		MATERIAL WEBS	)	

**PRELIMINARY AMENDMENT AND COVER LETTER  
SUBMITTING AMENDED PAGES OF APPLICATION**

Commissioner of Patents and Trademarks  
Washington, D.C. 20231

Sir:

Enclosed please find a copy of the International Preliminary Examination Report - Form PCT/IPEA/409 (hereinafter "Report"), and an English translation thereof, which was drawn on pages of description 1- 15 and the drawings as originally filed, and claims 1 - 30 as filed on May 17, 2001, and includes as an Annex amended claims 1 - 30 (in German and English).

Based upon the submission of amended claims, Applicants respectfully request examination on the merits of the application containing amended claims 1 - 30 (in place of originally filed claims 1 - 30).

Additionally, prior to the examination of the above-identified application including replacement claims 1 - 30, amendment of claims 3, 4, 6 - 26, and 30, as follows, is respectfully requested to remove multiple dependent claims.

**IN THE CLAIMS**

*Please amend the claims as follows (Marked-up copies of the amended claims are attached to the Appendix):*

3. (Amended) Method in accordance with claim 1,  
characterised in that  
  
the process data detection takes place in the region of part sections (14) in which machine settings can be changed, in particular by control and/or regulation of machine components.
4. (Amended) Method in accordance with claim 1,  
characterised in that  
  
process data concerning a plurality of different measured parameters are detected, preferably at least substantially simultaneously.
6. (Amended) Method in accordance with claim 1,  
characterised in that  
  
one measurement parameter relates to a characteristic paper parameter, in particular the moisture, the temperature, the thickness or the weight per unit area of a paper web.
7. (Amended) Method in accordance with claim 1,  
characterised in that  
  
one measurement parameter relates to a characteristic value of a dryer section (10), in particular to a surface characteristic, preferably the surface temperature of a dryer cylinder or of a roll.
8. (Amended) Method in accordance with claim 1,

characterised in that

one measurement parameter relates to a characteristic value of a steam system and/or condensate system of a dryer section (10).

9. (Amended) Method in accordance with claim 1,

characterised in that

one measurement parameter relates to a characteristic value of a screen, in particular its temperature, moisture content or permeability.

10. (Amended) Method in accordance with claim 1,

characterised in that

one measurement parameter relates to a characteristic value of air, in particular its temperature or moisture content, or of an airflow, in particular its direction or speed in the region of the machine section.

11. (Amended) Method in accordance with claim 1,

characterised in that

the process data are detected at least substantially uninterruptedly.

12. (Amended) Method in accordance with claim 1,

characterised in that

the process data are detected at preferably regular time intervals.

13. (Amended) Method in accordance with claim 1,

characterised in that

the process data are supplied to an evaluation unit (16) which is formed for the monitoring and/or influencing of the manufacturing process through, in particular,

continuous control or regulation of machine components in dependence on the process data.

14. (Amended) Method in accordance with claim 1,  
characterised in that,  
machine components are controlled and/or regulated independently of one another on the basis of the process data.
15. (Amended) Method in accordance with claim 1,  
characterised in that  
the process data are detected and evaluated for the carrying out of changes between different types of process, in particular of changes of type in paper making machines.
16. (Amended) Method in accordance with claim 1,  
characterised in that  
the process data are used for the localisation of disturbances, in particular of faulty machine components.
17. (Amended) Method in accordance with claim 1,  
characterised in that  
the process data are used in a model describing the manufacturing process, preferably at least with respect to the machine section.
18. (Amended) Method in accordance with claim 1,  
characterised in that  
the process data are transmitted to a location spatially separated from the machine, in particular by using the Internet.

19. (Amended) Method in accordance with claim 1,  
characterised in that  
the process data are detected and/or evaluated at a location spatially separated from the machine.
20. (Amended) Method in accordance with claim 1,  
characterised in that  
the process data are detected in a reflection measurement method.
21. (Amended) Method in accordance with claim 1,  
characterised in that  
the process data are detected in a reflection measurement method.
22. (Amended) Method in accordance with claim 1,  
characterised in that  
the longitudinal profile and/or the course of drying of the material web is preferably continuously checked and/or regulated, in particular by regulating the heating curve of the dryer section and/or regulation of the individual dryer groups, dryers or humidifiers.
23. (Amended) Method in accordance with claim 1,,  
characterised in that  
the process data are detected in the dryer section (10) at at least two measurement zones (12) in the process direction (P) after the last press.
24. (Amended) Method in accordance with claim 1,  
characterised in that  
the transverse moisture profile of the material web is regulated preferably section-wise on

the basis of the measured humidity content of the material web, in particular by zone-wise regulatable dryers, humidifiers, and/or within the press section (20) with at least one steam blowing box.

25. (Amended) Method in accordance with claim 1,

characterised in that

the longitudinal moisture profile of the material web is regulated on the basis of the measured humidity content of the material web, in particular by regulating the heating curve of the dryer section and/or by regulating the individual dryer groups, dryers and/or humidifiers.

26. (Amended) Method in accordance with claim 1,

characterised in that

the course of drying of the material web is regulated on the basis of the measured moisture content of the material web, in particular by regulating the heating curve of the dryer section and/or regulating the individual dryer groups, dryers and/or humidifiers.

30. (Amended) Measurement system in accordance with claim 28,

characterised in that

the measurement device is movable, in particular approximately perpendicular to the process direction (P) for the measurement of profiles of the respective parameter.

### **REMARKS**

Entry of the foregoing replacement sheets and amendment to the claims upon which the International Preliminary Examination Report is based is respectfully requested.

Should there be any questions, the Examiner is invited to contact the undersigned at the



P21469.A01

below listed number.

Respectfully submitted,  
Markus OECHSLE et al.



Neil F. Greenblum

Reg. No. 28,394

*35,543*

September 14, 2001  
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11/14/01 10:00 AM

**APPENDIX**

***Marked-Up Copies of the Amended Claims:***

3. (Amended) Method in accordance with claim 1 [or claim 2],  
characterised in that  
  
the process data detection takes place in the region of part sections (14) in which machine  
settings can be changed, in particular by control and/or regulation of machine  
components.
4. (Amended) Method in accordance with [at least one of the preceding claims] claim 1,  
characterised in that  
  
process data concerning a plurality of different measured parameters are detected,  
preferably at least substantially simultaneously.
6. (Amended) Method in accordance with [at least one of the preceding claims] claim 1,  
characterised in that  
  
one measurement parameter relates to a characteristic paper parameter, in particular the  
moisture, the temperature, the thickness or the weight per unit area of a paper web.
7. (Amended) Method in accordance with [at least one of the preceding claims] claim 1,  
characterised in that  
  
one measurement parameter relates to a characteristic value of a dryer section (10), in  
particular to a surface characteristic, preferably the surface temperature of a dryer cylinder  
or of a roll.
8. (Amended) Method in accordance with [at least one of the preceding claims] claim 1,  
characterised in that

one measurement parameter relates to a characteristic value of a steam system and/or condensate system of a dryer section (10).

9. (Amended) Method in accordance with [at least one of the preceding claims] claim 1, characterised in that

one measurement parameter relates to a characteristic value of a screen, in particular its temperature, moisture content or permeability.

10. (Amended) Method in accordance with [at least one of the preceding claims] claim 1, characterised in that

one measurement parameter relates to a characteristic value of air, in particular its temperature or moisture content, or of an airflow, in particular its direction or speed in the region of the machine section.

11. (Amended) Method in accordance with [at least one of the preceding claims] claim 1, characterised in that

the process data are detected at least substantially uninterruptedly.

12. (Amended) Method in accordance with [at least one of the claims 1 to 10] claim 1, characterised in that

the process data are detected at preferably regular time intervals.

13. (Amended) Method in accordance with [at least one of the preceding claims] claim 1, characterised in that

the process data are supplied to an evaluation unit (16) which is formed for the monitoring and/or influencing of the manufacturing process through, in particular, continuous control or regulation of machine components in dependence on the process

data.

14. (Amended) Method in accordance with [at least one of the preceding claims] claim 1, characterised in that,  
machine components are controlled and/or regulated independently of one another on the basis of the process data.
15. (Amended) Method in accordance with [at least one of the preceding claims] claim 1, characterised in that  
the process data are detected and evaluated for the carrying out of changes between different types of process, in particular of changes of type in paper making machines.
16. (Amended) Method in accordance with [at least one of the preceding claims] claim 1, characterised in that  
the process data are used for the localisation of disturbances, in particular of faulty machine components.
17. (Amended) Method in accordance with [at least one of the preceding claims] claim 1, characterised in that  
the process data are used in a model describing the manufacturing process, preferably at least with respect to the machine section.
18. (Amended) Method in accordance with [at least one of the preceding claims] claim 1, characterised in that  
the process data are transmitted to a location spatially separated from the machine, in particular by using the Internet.
19. (Amended) Method in accordance with [at least one of the preceding claims] claim 1,

:

:

characterised in that

the process data are detected and/or evaluated at a location spatially separated from the machine.

20. (Amended) Method in accordance with [at least one of the preceding claims] claim 1,

characterised in that

the process data are detected in a reflection measurement method.

21. (Amended) Method in accordance with [at least one of the preceding claims] claim 1,

characterised in that

the process data are detected in a reflection measurement method.

22. (Amended) Method in accordance with [at least one of the preceding claims] claim 1,

characterised in that

the longitudinal profile and/or the course of drying of the material web is preferably continuously checked and/or regulated, in particular by regulating the heating curve of the dryer section and/or regulation of the individual dryer groups, dryers or humidifiers.

23. (Amended) Method in accordance with [at least one of the preceding claims] claim 1,

characterised in that

the process data are detected in the dryer section (10) at at least two measurement zones (12) in the process direction (P) after the last press.

24. (Amended) Method in accordance with [at least one of the preceding claims] claim 1,

characterised in that

the transverse moisture profile of the material web is regulated preferably section-wise on the basis of the measured humidity content of the material web, in particular by zone-wise

:

:

regulatable dryers, humidifiers, and/or within the press section (20) with at least one steam blowing box.

25. (Amended) Method in accordance with [at least one of the preceding claims] claim 1, characterised in that

the longitudinal moisture profile of the material web is regulated on the basis of the measured humidity content of the material web, in particular by regulating the heating curve of the dryer section and/or by regulating the individual dryer groups, dryers and/or humidifiers.

26. (Amended) Method in accordance with [at least one of the preceding claims] claim 1, characterised in that

the course of drying of the material web is regulated on the basis of the measured moisture content of the material web, in particular by regulating the heating curve of the dryer section and/or regulating the individual dryer groups, dryers and/or humidifiers.

30. (Amended) Measurement system in accordance with claim 28 [or 29], characterised in that

the measurement device is movable, in particular approximately perpendicular to the process direction (P) for the measurement of profiles of the respective parameter.

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PCT/EP00/02198

**Method of operating a machine for the manufacture and/or  
refinement of material webs**

The invention relates to a method for the operation of a machine for the manufacture and/or refinement of material webs, in particular paper webs. The invention relates moreover to a measurement system for the carrying out of such a method.

Such machines, for example paper making machines, consists of a plurality of different machine sections of which at least some are in turn subdivided into further part sections. Each machine section or part section influences the quality of the finished product, for example of a paper web. It is possible to influence the manufacturing process by appropriate control and regulation of individual machine components forming the respective machine section or part section. The large number of possibilities of adjustment makes it difficult to determine the influence of changes which are made at individual machine components on the ability of the respective machine section or part section to function or on the quality of the finished product.

It is known to carry out moisture content, thickness and weight per unit area measurements following the dryer section of a paper making machine, for example before the roller, and to use these measurements for the control, regulation and optimisation of the process control. It is known, simply for the determination of the moisture content of the paper, to carry out measurements at the start of the dryer section, continuously, regularly - i.e. taking place at specific or process-dependent intervals - or

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in the short term. Furthermore it is known to carry out continuous, regular or short-term measurements in the steam system and condensate system of the dryer section and to use these measurements for the control and regulation of the process, with the pumps and switch-off valves simply being controlled in the main steam line which leads to the dryer section.

Known apparatuses and methods are for example described in "Das Papier" (The Paper) no. 12, 1995, p.771-775, in "TAPPI Proceedings 1992 Engineering Conference", p.629-638 and also p.639-654 and in "Pulp & Paper Canada", 98:12(1997), p.111-113. A measuring system for the determination of the moisture content of a fibre material web is known from the German patent application 19844927.5 with the filing date 30/09/1998, in which the measurement takes place where the fibre web lies on a substantially water-free, co-moving surface. A known apparatus for the measurement of, for example, the moisture content of a paper web is the instrument "INFRAGAUGE PRO" of the company Infrared Engineering.

The problem (object) underlying the invention is to provide a method and also a measuring system of the initially named kind with which a picture can be obtained of the manufacturing process as accurately as possible, in particular in a paper making machine, and which in particular enables changes to be made in the manufacturing process for its optimisation or change in targeted manner.

This object is satisfied by the features of claim 1 and in particular in that process data concerning at least one measured parameter which relates to



a manufacturing process are detected and jointly evaluated in the region of at least one machine section, in particular of the dryer section of a paper making machine, with the detection of the process data taking place at a plurality of measurement zones which are arranged in series in the process direction.

The invention makes it possible to obtain many pieces of information concerning the manufacturing process, at least with respect to the respective machine section. In this way, a substantially more accurate picture of the process or process section results which enables a better understanding of the influence of the individual machine components on the manufacturing process in a complex machine, such as, for example, in a paper making machine. The provision of a plurality of measurement zones arranged in series, which can each include several individual measurement positions, makes it possible to obtain information from such positions of the machine through which the material web moves in time sequence. Thus, for example, by measuring the moisture content of a paper web moving through a dryer section of a paper making machine, the time-dependent course of drying, and thus the influence of the individual components of the dryer section on the paper web can be investigated in detail. The joint evaluation of the process data detected at the individual measurement zones arranged in series enables an integrated consideration of all measurements and serves in this manner for an improved understanding of the respective machine section. By taking account of the web speed or process speed, individual points on the material path can be followed on their route through the respective machine section. The time-dependent course of the respectively investigated measured parameter can thus be found with a high accuracy. By providing a large number of measurement zones

arranged in series and/or by interpolation between the individual process data obtained at measurement zones spaced apart in the process direction it is thus possible to obtain continuous or quasi continuous longitudinal profiles of the respective measured parameter. Furthermore, the process data found in accordance with the invention can be used for the formation and/or the optimisation of mathematical models which at least describe the respective machine section. Since, in accordance with the invention, the respective measured parameter can be obtained spatially resolved in the process direction, as a result of the measured zones being arranged in series, disturbances, for example as a result of defective machine components, for example of a dryer cylinder, can be precisely localised. This enables faults to be overcome considerably more quickly.

In accordance with a preferred embodiment of the invention, the detection of process data takes place at least substantially simultaneously with respect to at least some measurement zones.

In this way, a large quantity of data is simultaneously available concerning different zones of the machine so that the data can be simultaneously evaluated directly following its detection. Through the use of fast computers, rapid on-line control or regulation of the machine can be carried out on the basis of established data.

In accordance with a further preferred embodiment of the invention, the detection of process data takes place in the vicinity of part sections in which machine settings can be changed, in particular by control and/or regulation of machine components.

Thus, by way of example, a measurement zone or a measurement position can be provided directly after a dryer system or of a group of dryer cylinders in the process direction, so that the influence of changes in the settings of the dryer cylinder or cylinders can be read off from the process data and can consequently be recognised at once. By providing a closed regulating circuit, the relevant machine section or part section can as a consequence be ideally set up in the shortest possible time. It is also possible to provide a measurement zone or a measurement location directly before the respective machine section or part section or before a specific machine component, in order to allow the initial conditions prevailing directly in front of this section to enter into the assessment of the respectively investigated section.

In accordance with a further preferred embodiment of the invention, process data are detected concerning a plurality of different measured parameters.

In this way, the manner of operation of the respective machine section or part section can be pictured in a more detailed manner through the process data that is obtained, so that - if necessary - action can be taken in the manufacturing process in a more differentiated manner. The data detection of the different measured parameters preferably also takes place at least substantially simultaneously in order to obtain a fast and accurate overview of the machine with respect to the investigated section or sections.

In a preferred variant, process data concerning measured parameters are detected which relate to the machine, the material web and to the environment.

At least all the important parameters through which the quality of the finished product can be influenced in some way or other can be subjected to an integrated consideration and assessment through the joint evaluation of the process data in order to set up the machine in such a way that it is ideally matched to the respectively prevailing conditions with respect to the respectively desired characteristics of the material web.

One measurement parameter can relate to a characteristic paper parameter of a paper web, for example the moisture content, the temperature, the weight per unit area, the thickness, various surface characteristics, the shrinkage behaviour, the air permeability, the extensibility of the paper, the tear length, the load at fracture, the tensile strength, the fibre orientation or the colour. Moreover, damage or a tearing of the paper web can be recognised.

Furthermore, a measured parameter can relate to a characteristic value of a dryer section, and indeed for example to a surface characteristic of the dryer cylinder or of a roll. For this, the surface temperature of the cylinder or of the roll can, for example, come into question.

The measured parameter can also relate to a characteristic value of a steam system and/or condensate system of the dryer section in a paper making machine.

Moreover, a measured parameter can relate to a characteristic value of a screen used in a dryer section. For this purpose, the moisture content, the temperature, the permeability and the degree of contamination of the respective screen come into question. It is also possible to detect damage, deformations, strains and stretching of the screen.

Furthermore, a measured parameter can relate to a characteristic value of the air, for example its temperature or moisture content, or to an airflow, for example its direction or speed, in the region of the respectively investigated machine section or part section.

The process data are preferably detected at least substantially uninterruptedly.

In this way a continuous monitoring and assessment of the manufacturing process is made possible which enables action to be taken at once in a manufacturing process, for example when faults arise.

The measurements take place in each measured zone with at least one measurement device which is either directly attached to the machine or to a frame or beam close to the machine. For the detection of data at a plurality of measurement locations within a measurement zone using a single measurement device, the latter can be movable relative to the machine or to the frame or beam.

The measurement device can, for example, be linearly movable or can generally have a plurality of degrees of freedom, each corresponding to a linear or rotary movement, in order to detect process data concerning a plu-

ality of individual measurement locations in a measurement zone associated with it.

The uninterrupted or continuous detection of data enables a continuous control and/or regulation of machine components in dependence on the process data, with it also being possible to act on individual machine components independently of one another. For this purpose, the process data can be supplied to an evaluation unit which monitors the manufacturing process and optionally acts on the machine components. On-line influencing of the machine or of the manufacturing process makes it possible to react at once to unpredictable changes or intended changes between different types of process, in particular for carrying out type changes of paper making machines by appropriate control or regulation of the respective machine components. Fast changes of type are in particular made possible by the invention.

In accordance with the invention the data detection can also take place at regular or irregular time intervals, in order, for example, to be able to carry out routine checks of the total machine or of individual machine sections or part sections. It is also possible to effect data detection only then when disturbances arise at the machine, in order, for example, to localise the source of disturbance by detection of the process data at measurement zones or measurement points arranged in series in the process direction. For this purpose at least one mobile measurement device can be provided which is installed to carry out the method of the invention in sequence at the individual measurement zones or measurement locations. It is fundamentally also possible to simultaneously investigate the machine, the material web and/or the environment at all measurement points or

measurement zones using a plurality of such mobile measurement devices.

In accordance with a further preferred embodiment of the invention the process data are stored in a process data bank.

The knowledge obtained concerning the respective manufacturing process or process section are in this manner not lost and can be made available to interested circles. Furthermore, external access to such banks of process data is possible, for example via the Internet, whereby remote diagnosis by the machine manufacturer is, for example, possible. Moreover, remote control or regulation of the machine or of the manufacturing process can take place from any desired location on the basis of the information which is stored in the data bank and which can be called up.

Furthermore, it is preferred when the process data can be detected in a reflection measurement process. For this, it is not necessary to use through- radiating processes to carry out measurements at the material web, which require a free run of the material web, so that the transmitter and receiver can be arranged at different sides of the material web. Measurements made using refraction methods in which the transmitter and receiver are arranged on the same side of the web do not require free runs and can also be carried out at very high web speeds in which free runs can no longer be realised. In accordance with the invention the process data relating to the material web can in each case be detected in a zone in which the material web is guided or supported, for example by a dryer screen, a roll or a cylinder.

The invention makes it possible to check and/or to regulate the longitudinal profile and/or the course of drying of the material web. This can take place by regulation of the heating curve of the drying section and/or of the individual dryer groups, dryers or humidifiers. This regulation can be effected in one or more part sections. The regulation preferably takes place continuously.

A preferred use of the invention are moisture content measurements along the dryer section. On the basis of the measured moisture content of the material web, i.e. by measuring web humidity, its transverse humidity profile, its longitudinal humidity profile and/or its drying progress can be regulated. This can, for example, takes place by regulation of the heating curve of the dryer section and/or by regulation of the individual dryer groups, dryers and/or humidifiers.

The object underlying the invention is moreover satisfied by a measurement system for carrying out the method of the invention which has at least one measurement device for the detection of process data relating to at least one measured parameter at at least one measurement point and also an evaluation unit for the joint evaluation of the process data.

The measurement system preferably includes at least one measurement device which is formed for the detection of process data at a plurality of measurement locations and for this purpose has at least two degrees of freedom, each corresponding to a rotary movement or to a linear movement, or which is rotatable about an axis. Process data can be detected at many measurement points in a short time with a single movable measurement device of this kind.



When, in accordance with a preferred variant, the measurement device is movable approximately perpendicular to the direction of web movement, machine direction or process direction for the measurement of transverse profiles of the respective measured parameter, it is possible to simultaneously obtain a plurality of transverse profiles and longitudinal profiles of the respective measured parameter by providing a plurality of such measurement devices in series in the process direction.

Further preferred embodiments of the invention are set forth in the subordinate claims, in the description and also in the drawing.

The invention will be described in the following by way of example with reference to a drawing, the single figure of which schematically shows a measurement system used at a paper making machine to carry out the method of the invention in accordance with an embodiment of the invention.

In the drawing a part of a paper making machine is shown in which a press section 20, a dryer section 10, a refinement section 22 and also a roller section 24 follow one another in the process direction P.

The dryer section and the refinement section 22 each include a plurality of part sections 14 which are symbolised by squares. In the dryer section 10 the part sections 14 can, for example, be individual dryer cylinders, groups of dryer cylinders or generally different drying systems.

## 12

Individual measurement zones 12 at which process data relating to at least one measured parameter is detected with at least one (not illustrated) measurement device are shown in the figure by hatched triangles.

One measurement device having a plurality of degrees of freedom and in particular being movable in at least one longitudinal direction, for example the machine direction, the transverse direction or the vertical direction, and also pivotable or rotatable via a joint in at least one plane is preferably provided in each measurement zone 12. One measurement zone 12 can thus be covered by a single measurement device in which the paper web, a machine component and the environment can be investigated at a plurality of individual measurement points.

In the embodiment shown in the Figure, the first three measurement zones 12 and also the fifth and seventh measurement zone 12 in the process direction are arranged beneath the respective part section 14 of the respectively machine components of the dryer section 10. The fourth and also the last measurement zone 12 are each located within a part section 14 of the dryer section 10 and can each, for example, be reached with a measurement device which is mounted at the free end of a beam which projects into the dryer section 10, for example into the intermediate space between the individual dryer cylinders. The sixth measurement zone 12 in the process direction P is located above the dryer section 10, with it being possible for the measurement device provided for carrying out the measurements at this measurement zone 12, to be mounted on a beam or frame which extends over the dryer section in the manner of a hall crane.

Each measurement device includes at least one measurement head which is designed for the detection of data relating to one measured parameter. The measurement can be carried out either at the paper making machine, at the paper web or in the environment.

In this connection some of the measurement zones 12 provided in series in the process direction P can each be provided for the measurement of the same measured parameter, for example the moisture content of the paper web, in order, in this way, to obtain a longitudinal profile of this measured parameter. Furthermore, different measurement parameters can be measured at each measurement zone 12 either with the aid of a plurality of different measurement devices or of a plurality of differently designed measurement heads which are combined to one unit or measurement device. In this manner, measurements at the paper web, at the paper making machine or in the environment can be made at each measurement zone 12.

The same also applies to the refining section 12 at which two measurement zones 12 are provided in the illustrated embodiment, with the first measurement zone 12 in the process direction P being arranged beneath the refinement section 22 and the second measurement zone 12 being located within the rear one of two part sections 14.

The measurement zones 12 located beneath and above the dryer section 10 and also the refinement section 22 are each located directly in front of or behind a part section 14 in the process direction P.

As indicated in the Figure by the arrows emerging from the measurement zones 12, the process data are supplied to a common detection unit 18 which communicates with the measurement devices arranged in the measurement zones 12.

The process data are transferred from the detection unit 18 to a common evaluation unit 16 as is indicated in the Figure by the arrow T. In the evaluation unit 16 a joint evaluation of the process data takes place in which additional parameters, such as, for example, the process speed, can also be taken into account in order to obtain, through the integrated consideration of the process data and eventually of the additional data, a picture of the state of the dryer section 10 and of the refining section 22 and also of their influence on the paper web and thus on the manufacturing process.

The detection and evaluation of the process data preferably takes place uninterruptedly in order to enable a continuous monitoring and assessment of the paper making machine or of the dryer section 10 and refining section 22. The evaluation unit 16 can be provided with a computer on which software is installed for the modelling of the manufacturing process or of the processes which take place in the dryer section 10 and in the refining section 22. The process data which reflect the actual conditions at the paper making machine can be used for the checking and optimisation of such models. In particular, when the machine is to be controlled or regulated on the basis of such models, the checking and adaptation of the models takes place in dependence on the actual process data on-line in order to realise a continuous influencing of the machine while taking account of the process data.

On the basis of the detected process data and/or of the initial data of process models, a control and/or regulation of individual machine components in the dryer section 10 and in the refining section 22 takes place, if necessary, through the evaluation unit 16, as indicated by the arrow R in the drawing. Machine components at other sections of the paper making machine at which no data which enters into the integrated consideration is detected can basically also be acted on via the evaluation unit 16.

Furthermore, the possibility exists, in accordance with the invention, of a data transfer indicated in the Figure by the arrow D to a databank for the storage of process data or via data lines, for example utilising the Internet, to external receivers. In this manner, a remote diagnosis and also remote control or regulation of the paper making machine can, for example, take place by the machine manufacturer.

**Patent Claims**

1. Method of operating a machine for the manufacture and/or refinement of material webs, in particular paper webs, in which process data concerning at least one measured parameter relating to the manufacturing process are detected in the region of at least one machine section, in particular the drying section (10) of a paper making machine, wherein the process data detection takes place at a plurality of measurement zones (12) which are arranged in series in the process direction (P).
2. Method in accordance with claim 1,  
characterised in that  
the process data detection takes place at least substantially simultaneously, at least with respect to some measurement zones (12).
3. Method in accordance with claim 1 or claim 2,  
characterised in that  
the process data detection takes place in the region of part sections (14) in which machine settings can be changed, in particular by control and/or regulation of machine components.
4. Method in accordance with at least one of the preceding claims,  
characterised in that  
process data concerning a plurality of different measured parameters are detected, preferably at least substantially simultaneously.
5. Method in accordance with claim 4,

characterised in that

the measured parameters relate to the machine, the material web and to the environment.

6. Method in accordance with at least one of the preceding claims, characterised in that  
one measurement parameter relates to a characteristic paper parameter, in particular the moisture, the temperature, the thickness or the weight per unit area of a paper web.
7. Method in accordance with at least one of the preceding claims, characterised in that  
one measurement parameter relates to a characteristic value of a dryer section (10), in particular to a surface characteristic, preferably the surface temperature of a dryer cylinder or of a roll.
8. Method in accordance with at least one of the preceding claims, characterised in that  
one measurement parameter relates to a characteristic value of a steam system and/or condensate system of a dryer section (10).
9. Method in accordance with at least one of the preceding claims, characterised in that  
one measurement parameter relates to a characteristic value of a screen, in particular its temperature, moisture content or permeability.
10. Method in accordance with at least one of the preceding claims,

characterised in that  
one measurement parameter relates to a characteristic value of air,  
in particular its temperature or moisture content, or of an airflow, in  
particular its direction or speed in the region of the machine section.

11. Method in accordance with at least one of the preceding claims,  
characterised in that  
the process data are detected at least substantially uninterruptedly.
12. Method in accordance with at least one of the claims 1 to 10,  
characterised in that  
the process data are detected at preferably regular time intervals.
13. Method in accordance with at least one of the preceding claims,  
characterised in that  
the process data are supplied to an evaluation unit (16) which is  
formed for the monitoring and/or influencing of the manufacturing  
process through, in particular, continuous control or regulation of  
machine components in dependence on the process data.
14. Method in accordance with at least one of the preceding claims,  
characterised in that  
machine components are controlled and/or regulated independently  
of one another on the basis of the process data.
15. Method in accordance with at least one of the preceding claims,  
characterised in that



the process data are detected and evaluated for the carrying out of changes between different types of process, in particular of changes of type in paper making machines.

16. Method in accordance with at least one of the preceding claims, characterised in that  
the process data are used for the localisation of disturbances, in particular of faulty machine components.
17. Method in accordance with at least one of the preceding claims, characterised in that  
the process data are used in a model describing the manufacturing process, preferably at least with respect to the machine section.
18. Method in accordance with at least one of the preceding claims, characterised in that  
the process data are stored in a process data bank.
19. Method in accordance with at least one of the preceding claims, characterised in that  
the process data are transmitted to a location spatially separated from the machine, in particular by using the Internet.
20. Method in accordance with at least one of the preceding claims, characterised in that  
the process data are detected and/or evaluated at a location spatially separated from the machine.

21. Method in accordance with at least one of the preceding claims, characterised in that  
the process data are detected in a reflection measurement method.
22. Method in accordance with at least one of the preceding claims, characterised in that  
the process data relate to the material web and are each detected in a region at which the material web is guided or supported, in particular by a dryer screen, a roll or a cylinder.
23. Method in accordance with at least one of the preceding claims, characterised in that  
the longitudinal profile and/or the course of drying of the material web is preferably continuously checked and/or regulated, in particular by regulating the heating curve of the dryer section and/or regulation of the individual dryer groups, dryers or humidifiers.
24. Method in accordance with at least one of the preceding claims,, characterised in that  
the process data are detected in the dryer section (10) at at least two measurement zones (12) in the process direction (P) after the last press.
25. Method in accordance with at least one of the preceding claims, characterised in that  
the transverse moisture profile of the material web is regulated preferably section-wise on the basis of the measured humidity content of the material web, in particular by zone-wise regulatable dryers,

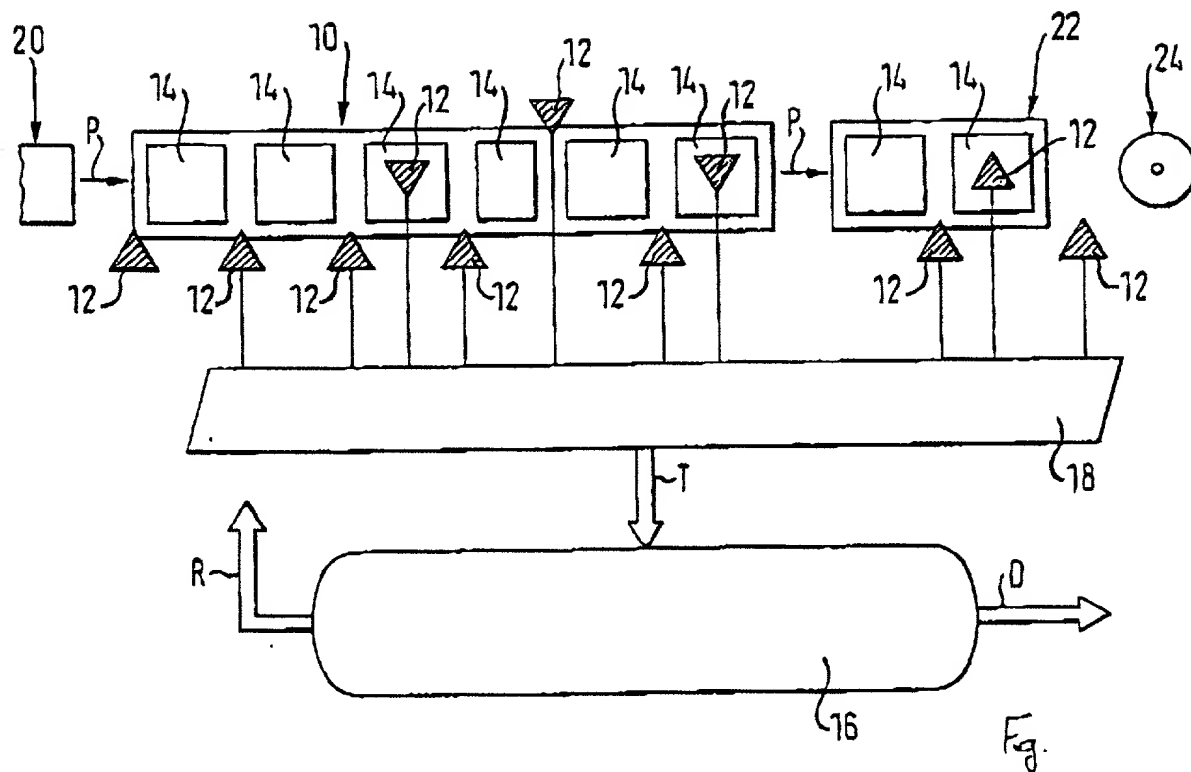
humidifiers, and/or within the press section (20) with at least one steam blowing box.

26. Method in accordance with at least one of the preceding claims, characterised in that the longitudinal moisture profile of the material web is regulated on the basis of the measured humidity content of the material web, in particular by regulating the heating curve of the dryer section and/or by regulating the individual dryer groups, dryers and/or humidifiers.
27. Method in accordance with at least one of the preceding claims, characterised in that the course of drying of the material web is regulated on the basis of the measured moisture content of the material web, in particular by regulating the heating curve of the dryer section and/or regulating the individual dryer groups, dryers and/or humidifiers.
28. Measurement system for carrying out the method in accordance with at least one of the preceding claims, with at least one measurement device for the detection of process data relating to at least one measured parameter at at least one measurement location in a measurement zone (12) and with an evaluation unit (16) for the joint evaluation of the process data.
29. Measurement system in accordance with claim 28, characterised in that

the measurement device is rotatable about an axis or has at least two degrees of freedom, each corresponding to a rotary movement or a linear movement, for the detection of process data at a plurality of measurement locations in one measurement zone (12).

30. Measurement system in accordance with claim 28 or 29, characterised in that the measurement device is movable, in particular approximately perpendicular to the process direction (P) for the measurement of profiles of the respective parameter.

104027-00000000



Translation of the submission to the EPO of May 27, 2001

**File reference: PCT/EP00/02198**

**Applicants: Voith Paper Patent GmbH et al.**

**In response to the submission of March 9, 2001:**

New patent claims 1 to 30 are submitted on which the further examination proceedings should be based in place of the previous claims.

Likewise enclosed is a version of the claims with remarks relating to the amendments made, with the deletions being marked by the cancelled text and additional text being marked with underlining.

In comparison to original claim 1 the new claim 1 contains the restriction in accordance with which the process data are detected in the region of a dryer section of a paper making machine comprising a plurality of dryer groups and in each case one measurement zone including at least one measurement location is associated with each dryer group, see the characterising part of new claim 1.

The corresponding disclosure can be seen from the following:

The fact that the process data can be detected in the region of a dryer section of a paper making machine is already set forth as an optional feature in original claim 1. The fact that the dryer section can include a plurality of dryer groups is, for example, set forth on page 10, lines 7 and 17 of the original description (see for example also the original claims 23, 26 and 27). In the last paragraph of page 11 of the original description there is talk of "part sections 14" which can be "groups of dryer cylinders" (cylinder

groups). In accordance with page 12, para. 3 of the original description, a respective measurement zone 12 (see also the single Figure) can be associated with each of these part sections 14 (dryer groups) (see, for example, also original claim 3). It can finally be seen from page 3, lines 13 and 14 of the original description, that the measurement zones "can each comprise a plurality of individual measurement points (see, for example, also page 12, para. 1 of the original description).

New claim 27, which is simply optionally dependent on the preceding claims, and accordingly can also be seen as an independent claim, goes back to original claim 18, to original claim 1, from which it depends, and to page 9, paras. 2 and 3 of the original description (see in particular also original claim 19).

The new claim 28 directed to the measurement system contains the same additional restriction as the new method claim 1.

The new claims 2 to 17 correspond to the original claims with the same number. The new claims 18 to 26 correspond to the original claims 19 to 27. The new claims 29 to 30 are identical to the original claims 29 to 30.

The claims 1, 27 and 28 are each delimited over the prior art DE 3901378 A (D1) named at the first position in the official letter.

The restriction contained in new method claim 1 and also in the new claim 28 relating to the measurement system, to a dryer section comprising a plurality of dryer groups and to the (simultaneous) measurement at at least one measurement point of each dryer group is neither anticipated nor rendered obvious by the cited prior art. As a result of the design of the

invention, a continuous regulation of the longitudinal profiles and of the drying progress over the region of a plurality of dryer groups and/or, for example, a moisture measurement along the dryer section over a plurality of dryer groups, is now for example possible by an appropriate control of the heating power of each dryer group (temperature of the dryer cylinders), in particular on the basis of the moisture content measurements.

Previously, it was generally customary to effect corresponding measurements only at the end of the dryer section. One could thus admittedly obtain information concerning the corresponding parameters of the finished web, however, no possibility existed of considering the dryer section as a whole. As a result of the design in accordance with the invention it is now not only possible to find faults within the dryer section, but rather action can be taken at different points of the dryer section in order to obtain the desired results.

The document D1 is concerned exclusively with the drying of a coating. Since a respective coating of the web takes place after the dryer section of the relevant paper making machine (see for example also column 1, lines 19 and 20 of D1), the relevant post-drying (drying of the coating) has nothing to do with the dryer section of the paper making machine.

The document D2 is concerned with an optimisation of the thermal treatment of textile products in tensioning, drying and fixing machines. Accordingly, no pointers can be found in the citation D2 with respect to the process data detection in a dryer section of a paper making machine comprising a plurality of dryer groups.



The document D3 contains no pointer to the effect that the dryer section 1/9 of the paper making machine shown in Fig. 1 can also include a plurality of dryer groups. Accordingly, there is also a lack of any form of pointer as to how process data detection can take place in a dryer section with a plurality of such dryer groups. The sensors 68 and 69 are temperature sensors with which the temperature inside the steam dryer 21 of one and the same dryer group is measured (see, for example, page 13, lines 17 and 18 of D3).

D4 also contains no pointer as to how the relevant dryer section 28 (Fig. 1) can also include a plurality of dryer groups. Accordingly, this document is also not able to give the person skilled in the art any form of pointer with respect to process data detection in the event of a dryer section comprising a plurality of dryer groups.

The comparable subjects of the new claims 1 and 28 are thus neither anticipated nor rendered obvious by the cited prior art.

The same also applies to the subject of new claim 27. There is also no discussion in any of the named documents that the process data are stored in a bank of process data to which external access can be made via the Internet. The bank of process data set forth in new claim 27 can in particular serve as a basis for a remote diagnosis and/or rapid adaptation of the process when a change of type (of the fibre material web) takes place.

Signed

Patent Attorney

Encl. Patent claims 1 - 30 (3-fold)

Günther Kurz

PCT/EP00/02198

S 7473 - Ku/ho

Voith Sulzer Patent GmbH et al.

**New Patent Claims 1 - 30**

1. Method of operating a machine for the manufacture and/or refinement of material webs, in particular paper webs, in which process data concerning at least one measured parameter relating to the manufacturing process are detected in the region of at least one machine section, wherein the process data detection takes place at a plurality of measurement zones (12) which are arranged in series in the process direction (P),  
characterised in that  
process data are detected in a dryer section (10) of a paper making machine including a plurality of dryer groups (14) and a respective measurement zone (12) including at least one measurement location is associated with each dryer group (14).
2. Method in accordance with claim 1,  
characterised in that  
the process data detection takes place at least substantially simultaneously, at least with respect to some measurement zones (12).
3. Method in accordance with claim 1 or claim 2,  
characterised in that

the process data detection takes place in the region of part sections (14) in which machine settings can be changed, in particular by control and/or regulation of machine components.

4. Method in accordance with at least one of the preceding claims, characterised in that  
process data concerning a plurality of different measured parameters are detected, preferably at least substantially simultaneously.
5. Method in accordance with claim 4, characterised in that  
the measured parameters relate to the machine, the material web and to the environment.
6. Method in accordance with at least one of the preceding claims, characterised in that  
one measurement parameter relates to a characteristic paper parameter, in particular the moisture, the temperature, the thickness or the weight per unit area of a paper web.
7. Method in accordance with at least one of the preceding claims, characterised in that  
one measurement parameter relates to a characteristic value of a dryer section (10), in particular to a surface characteristic, preferably the surface temperature of a dryer cylinder or of a roll.
8. Method in accordance with at least one of the preceding claims, characterised in that

one measurement parameter relates to a characteristic value of a steam system and/or condensate system of a dryer section (10).

9. Method in accordance with at least one of the preceding claims, characterised in that  
one measurement parameter relates to a characteristic value of a screen, in particular its temperature, moisture content or permeability.
10. Method in accordance with at least one of the preceding claims, characterised in that  
one measurement parameter relates to a characteristic value of air, in particular its temperature or moisture content, or of an airflow, in particular its direction or speed in the region of the machine section.
11. Method in accordance with at least one of the preceding claims, characterised in that  
the process data are detected at least substantially uninterruptedly.
12. Method in accordance with at least one of the claims 1 to 10, characterised in that  
the process data are detected at preferably regular time intervals.
13. Method in accordance with at least one of the preceding claims, characterised in that  
the process data are supplied to an evaluation unit (16) which is formed for the monitoring and/or influencing of the manufacturing

process through, in particular, continuous control or regulation of machine components in dependence on the process data.

14. Method in accordance with at least one of the preceding claims, characterised in that machine components are controlled and/or regulated independently of one another on the basis of the process data.
15. Method in accordance with at least one of the preceding claims, characterised in that the process data are detected and evaluated for the carrying out of changes between different types of process, in particular of changes of type in paper making machines.
16. Method in accordance with at least one of the preceding claims, characterised in that the process data are used for the localisation of disturbances, in particular of faulty machine components.
17. Method in accordance with at least one of the preceding claims, characterised in that the process data are used in a model describing the manufacturing process, preferably at least with respect to the machine section.
18. Method in accordance with at least one of the preceding claims, characterised in that the process data are transmitted to a location spatially separated from the machine, in particular by using the Internet.

19. Method in accordance with at least one of the preceding claims, characterised in that the process data are detected and/or evaluated at a location spatially separated from the machine.
20. Method in accordance with at least one of the preceding claims, characterised in that the process data are detected in a reflection measurement method.
21. Method in accordance with at least one of the preceding claims, characterised in that the process data relate to the material web and are each detected in a region at which the material web is guided or supported, in particular by a dryer screen, a roll or a cylinder.
22. Method in accordance with at least one of the preceding claims, characterised in that the longitudinal profile and/or the course of drying of the material web is preferably continuously checked and/or regulated, in particular by regulating the heating curve of the dryer section and/or regulation of the individual dryer groups, dryers or humidifiers.
23. Method in accordance with at least one of the preceding claims,, characterised in that the process data are detected in the dryer section (10) at at least two measurement zones (12) in the process direction (P) after the last press.

24. Method in accordance with at least one of the preceding claims, characterised in that the transverse moisture profile of the material web is regulated preferably section-wise on the basis of the measured humidity content of the material web, in particular by zone-wise regulatable dryers, humidifiers, and/or within the press section (20) with at least one steam blowing box.
25. Method in accordance with at least one of the preceding claims, characterised in that the longitudinal moisture profile of the material web is regulated on the basis of the measured humidity content of the material web, in particular by regulating the heating curve of the dryer section and/or by regulating the individual dryer groups, dryers and/or humidifiers.
26. Method in accordance with at least one of the preceding claims, characterised in that the course of drying of the material web is regulated on the basis of the measured moisture content of the material web, in particular by regulating the heating curve of the dryer section and/or regulating the individual dryer groups, dryers and/or humidifiers.
27. Method of operating a machine for the manufacture and/or refinement of material webs, in particular paper webs, in which process data concerning at least one measured parameter relating to the manufacturing process are detected in the region of at least one ma-

chine section, in particular the dryer section (10) of a paper making machine, wherein the process data detection takes place at a plurality of measurement zones (12) which are arranged in series in the process direction (P), in particular in accordance with one of the preceding claims,

characterised in that

the process data are deposited in a process data bank which can be externally accessed, preferably via the Internet.

28. Measurement system for carrying out the method in accordance with at least one of the preceding claims, with at least one measurement device for the detection of process data relating to at least one measured parameter at at least one measurement location in a measurement zone (12) and with an evaluation unit (16) for the joint evaluation of the process data,
- characterised in that
- measurement devices are provided in the region of the dryer section (10) of a paper making machine including a plurality of dryer groups (14) and a respective measurement zone (12) including at least one measurement location is associated with each dryer group (14).
29. Measurement system in accordance with claim 28,
- characterised in that
- the measurement device is rotatable about an axis or has at least two degrees of freedom, each corresponding to a rotary movement or a linear movement, for the detection of process data at a plurality of measurement locations in one measurement zone (12).



30. Measurement system in accordance with claim 28 or 29, characterised in that the measurement device is movable, in particular approximately perpendicular to the process direction (P) for the measurement of profiles of the respective parameter.

Patentgesetz

PCT/EP00/02198

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Voith Sulzer Patent GmbH et al.**New Patent Claims 1 - 30****Patent Claims**

1. Method of operating a machine for the manufacture and/or refinement of material webs, in particular paper webs, in which process data concerning at least one measured parameter relating to the manufacturing process are detected in the region of at least one machine section, ~~in particular the drying section (10) of a paper making machine, wherein the process data detection takes place at a plurality of measurement zones (12) which are arranged in series in the process direction (P);~~  
characterised in that  
process data are detected in a dryer section (10) of a paper making machine including a plurality of dryer groups (14) and a respective measurement zone (12) including at least one measurement location is associated with each dryer group (14).
2. Method in accordance with claim 1,  
characterised in that  
the process data detection takes place at least substantially simultaneously, at least with respect to some measurement zones (12).

3. Method in accordance with claim 1 or claim 2,  
characterised in that  
the process data detection takes place in the region of part sections  
(14) in which machine settings can be changed, in particular by  
control and/or regulation of machine components.
4. Method in accordance with at least one of the preceding claims,  
characterised in that  
process data concerning a plurality of different measured parameters  
are detected, preferably at least substantially simultaneously.
5. Method in accordance with claim 4,  
characterised in that  
the measured parameters relate to the machine, the material web  
and to the environment.
6. Method in accordance with at least one of the preceding claims,  
characterised in that  
one measurement parameter relates to a characteristic paper parameter,  
in particular the moisture, the temperature, the thickness  
or the weight per unit area of a paper web.
7. Method in accordance with at least one of the preceding claims,  
characterised in that  
one measurement parameter relates to a characteristic value of a  
dryer section (10), in particular to a surface characteristic, preferably  
the surface temperature of a dryer cylinder or of a roll.

8. Method in accordance with at least one of the preceding claims, characterised in that  
one measurement parameter relates to a characteristic value of a steam system and/or condensate system of a dryer section (10).
9. Method in accordance with at least one of the preceding claims, characterised in that  
one measurement parameter relates to a characteristic value of a screen, in particular its temperature, moisture content or permeability.
10. Method in accordance with at least one of the preceding claims, characterised in that  
one measurement parameter relates to a characteristic value of air, in particular its temperature or moisture content, or of an airflow, in particular its direction or speed in the region of the machine section.
11. Method in accordance with at least one of the preceding claims, characterised in that  
the process data are detected at least substantially uninterruptedly.
12. Method in accordance with at least one of the claims 1 to 10, characterised in that  
the process data are detected at preferably regular time intervals.
13. Method in accordance with at least one of the preceding claims, characterised in that

the process data are supplied to an evaluation unit (16) which is formed for the monitoring and/or influencing of the manufacturing process through, in particular, continuous control or regulation of machine components in dependence on the process data.

14. Method in accordance with at least one of the preceding claims, characterised in that machine components are controlled and/or regulated independently of one another on the basis of the process data.
15. Method in accordance with at least one of the preceding claims, characterised in that the process data are detected and evaluated for the carrying out of changes between different types of process, in particular of changes of type in paper making machines.
16. Method in accordance with at least one of the preceding claims, characterised in that the process data are used for the localisation of disturbances, in particular of faulty machine components.
17. Method in accordance with at least one of the preceding claims, characterised in that the process data are used in a model describing the manufacturing process, preferably at least with respect to the machine section.
- ~~18. Method in accordance with at least one of the preceding claims, characterised in that~~

~~the process data are stored in a process data bank.~~

1918. Method in accordance with at least one of the preceding claims,  
characterised in that

the process data are transmitted to a location spatially separated  
from the machine, in particular by using the Internet.

2019. Method in accordance with at least one of the preceding claims,  
characterised in that

the process data are detected and/or evaluated at a location spa-  
tially separated from the machine.

2120. Method in accordance with at least one of the preceding claims,  
characterised in that

the process data are detected in a reflection measurement method.

2221. Method in accordance with at least one of the preceding claims,  
characterised in that

the process data relate to the material web and are each detected in  
a region at which the material web is guided or supported, in par-  
ticular by a dryer screen, a roll or a cylinder.

2322. Method in accordance with at least one of the preceding claims,  
characterised in that

the longitudinal profile and/or the course of drying of the material  
web is preferably continuously checked and/or regulated, in par-  
ticular by regulating the heating curve of the dryer section and/or  
regulation of the individual dryer groups, dryers or humidifiers.

2423. Method in accordance with at least one of the preceding claims,, characterised in that the process data are detected in the dryer section (10) at at least two measurement zones (12) in the process direction (P) after the last press.

2524. Method in accordance with at least one of the preceding claims, characterised in that the transverse moisture profile of the material web is regulated preferably section-wise on the basis of the measured humidity content of the material web, in particular by zone-wise regulatable dryers, humidifiers, and/or within the press section (20) with at least one steam blowing box.

2625. Method in accordance with at least one of the preceding claims, characterised in that the longitudinal moisture profile of the material web is regulated on the basis of the measured humidity content of the material web, in particular by regulating the heating curve of the dryer section and/or by regulating the individual dryer groups, dryers and/or humidifiers.

2726. Method in accordance with at least one of the preceding claims, characterised in that the course of drying of the material web is regulated on the basis of the measured moisture content of the material web, in particular by

regulating the heating curve of the dryer section and/or regulating the individual dryer groups, dryers and/or humidifiers.

27. Method of operating a machine for the manufacture and/or refinement of material webs, in particular paper webs, in which process data concerning at least one measured parameter relating to the manufacturing process are detected in the region of at least one machine section, in particular the dryer section (10) of a paper making machine, wherein the process data detection takes place at a plurality of measurement zones (12) which are arranged in series in the process direction (P), in particular in accordance with one of the preceding claims,  
characterised in that  
the process data are deposited in a process data bank which can be externally accessed, preferably via the Internet.
28. Measurement system for carrying out the method in accordance with at least one of the preceding claims, with at least one measurement device for the detection of process data relating to at least one measured parameter at at least one measurement location in a measurement zone (12) and with an evaluation unit (16) for the joint evaluation of the process data.  
characterised in that  
measurement devices are provided in the region of the dryer section (10) of a paper making machine including a plurality of dryer groups (14) and a respective measurement zone (12) including at least one measurement location is associated with each dryer group (14).



29. Measurement system in accordance with claim 28,  
characterised in that  
the measurement device is rotatable about an axis or has at least  
two degrees of freedom, each corresponding to a rotary movement or  
a linear movement, for the detection of process data at a plurality of  
measurement locations in one measurement zone (12).
30. Measurement system in accordance with claim 28 or 29,  
characterised in that  
the measurement device is movable, in particular approximately  
perpendicular to the process direction (P) for the measurement of  
profiles of the respective parameter.

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**Declaration and Power of Attorney For Utility or Design Patent Application**Erklärung für Patentanmeldungen zur Gebrauchseignung und Entwicklung  
mit Vollmacht

## German Language Declaration

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☒ wurde angemeldet am 13 MÄRZ 2000  
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und wurde am 14 September 2001 abgeändert (falls zutreffend)  
oder

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für welche Priorität beansprucht wird, vorangeht.

## Prior Foreign Applications

Frühere ausländische Anmeldungen

<u>199 11 394.7</u>	<u>GERMANY</u>
(Number)	(Country)
(Nummer)	(Land)
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(Number)	(Country)
(Nummer)	(Land)

<u>15/MARCH/1999</u>
(Day/Month/Year Filed)
(Tag/Monat/Jahr der Anmeldung)
_____
(Day/Month/Year Filed)
(Tag/Monat/Jahr der Anmeldung)

Priority Claimed  
Prioritätsanspruch

<input checked="" type="checkbox"/>	<input type="checkbox"/>
Yes	No
Ja	Nein
<input type="checkbox"/>	<input type="checkbox"/>
Yes	No
Ja	Nein

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As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated  
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I believe I am the original, first and sole inventor (if only one  
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**METHOD FOR OPERATING A MACHINE FOR  
PRODUCING AND/OR IMPROVING MATERIAL WEBS**

the specification of which is attached hereto unless the following  
box is checked:

☒ was filed on MARCH 13, 2000 as  
United States Application Number \_\_\_\_\_  
and was amended on September 14, 2001 (if applicable)  
or,

PCT International Application Number PCT/EP00/02198  
and was amended on MAY 17, 2001 (if applicable).

I hereby state that I have reviewed and understand the contents of  
the above identified specification, including the claims, as  
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(Application Number)  
(Aktenzeichen)

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(Tag/Monat/Jahr der Anmeldung)

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(Tag/Monat/Jahr der Anmeldung)

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(Application No.)  
(Aktenzeichen)

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(patentiert, schwebend, aufgegeben)  
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**KUNDENNUMMER 7055**

**CUSTOMER NUMBER 7055**

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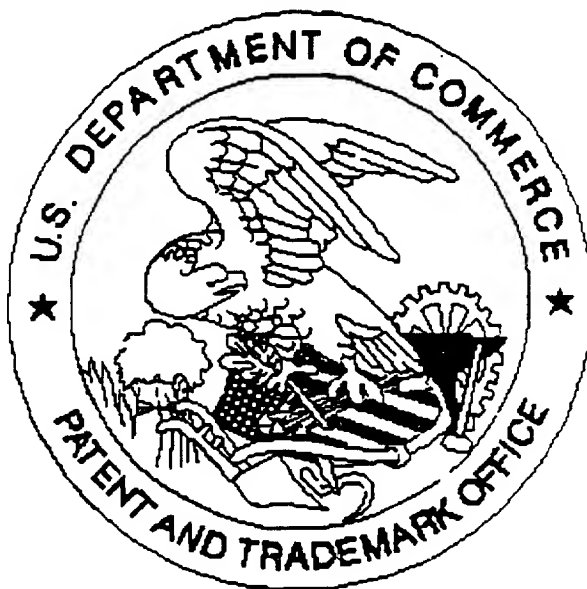
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